Having thus described the present invention, it is now claimed:

1. An expansion shell assembly for mine roof bolts, comprising:

an expansion member threaded onto an associated mine roof bolt;

a support device annularly disposed around the associated roof bolt; and

an expansion shell annularly disposed around the associated roof bolt between the expansion member and the support device, the expansion shell having a base ring for engaging the support device and fingers for engaging the expansion member, wherein the engagement between the base ring and the support device permits axial traverse movement of the support device relative to the expansion shell for tensioning the roof bolt.

2. The expansion shell assembly of claim 1 wherein the support device includes a tapered surface for facilitating the axial traverse movement.

3. The expansion shell assembly of claim 1 wherein the engagement between the base ring and the support device only permits the axial traverse movement at a predetermined axial force.

4. The expansion shell assembly of claim 1 wherein the engagement between the base ring and the support device only permits the axial traverse movement at a predetermined bolt torque.

5. The expansion shell assembly of claim 1 wherein the base ring of the expansion shell has a precisely controlled inner diameter corresponding to a diameter of the support device to facilitate the axial traverse movement.

6. The expansion shell assembly of claim 1 wherein the base ring of the shell expands upon application of a sufficient force by the support device to facilitate the axial traverse movement.

7. The expansion shell assembly of claim 1 wherein the base ring of the expansion shell fractures upon application of a sufficient force by the support device to facilitate the axial traverse movement.

8. The expansion shell assembly of claim 7 wherein the expansion shell includes a weakened area to facilitate the fracturing of the expansion shell.

9. The expansion shell assembly of claim 8 wherein the weakened area is at least one notch.

10. The expansion shell assembly of claim 6 wherein the expansion shell includes a split to facilitate the expansion of the expansion shell.

11. The expansion shell assembly of claim 7 wherein the expansion shell is relieved to facilitate the fracturing of the expansion shell.

12. The expansion shell assembly of claim 1 wherein the support device comprises a threaded lower support and an

upper support for reducing the amount of torque transferred to the expansion shell during installation.

13. The expansion shell assembly of claim 1 further comprising an antifriction washer adjacent a lower end of the support device for reducing the amount of torque transferred to the expansion shell during installation.

14. The expansion shell assembly of claim 1 wherein at least a portion of the support device includes an antifriction coating to reduce the amount of torque transferred to the expansion shell during installation.

15. The expansion shell assembly of claim 1 wherein the support device is positioned on an unthreaded portion of the roof bolt between a threaded portion of the roof bolt and a shoulder of the roof bolt prior to threads being rolled on the threaded portion to generally restrict axial movement of the support device.

16. The expansion shell assembly of claim 1 wherein the support device is unthreaded and slidably received on the bolt adjacent a shoulder of the bolt.

17. A bolt and anchor assembly for securing a mine roof bolt, comprising:

an elongated bolt;

an expansion shell having an aperture for receiving the elongated bolt;

an expansion member disposed on one end of the elongated bolt for expanding the expansion shell; and

a shell support having a shell engaging portion radially disposed between and in contact with the elongated bolt and the expansion shell for maintaining the axial position of the expansion shell relative to the elongated bolt while the expansion member forces the shell to engage a rock formation and for moving axially relative to the expansion shell while the elongated bolt is tensioned after engagement to the rock formation.

18. The bolt and anchor assembly of claim 17 wherein the shell support is formed integrally with the elongated bolt.

19. An expansion shell assembly for mine roof bolts, comprising:

an expansion member threaded onto an associated bolt;

a support device annularly disposed around the associated bolt; and

a shell annularly disposed on the bolt between the expansion member and the support device, the expansion shell having a base ring with a tapered surface for mating engagement with a corresponding tapered surface on the support device and fingers for engaging the expansion member, wherein the mating engagement allows increasing friction forces to hold the support device in a non-rotating position at a predetermined bolt torque.

20. A method for anchoring an elongated threaded member to a rock formation, comprising the steps of:

(a) providing an elongated member having a threaded end portion that is to be anchored to a rock formation,

(b) providing an expansion shell assembly on the threaded end portion of the elongated member, the expansion

shell assembly comprising an expansion shell, a plug for expanding the expansion shell, and a support member for supporting the expansion shell;

(c) forming a blind drilled hole in the rock formation for the elongated member and the expansion shell assembly;

(d) advancing the elongated member with the expansion shell assembly carried thereon into the blind drilled hole;

(e) rotating the elongated member to effect a gripping of the rock formation by the expansion shell assembly within the blind drilled hole, the support member generally maintaining engagement between the plug and the expansion shell;

(f) further rotating the elongated member to tension the elongated member, the support member axially traversing within the expansion shell to permit the tensioning.

21. The method of claim 20 further comprising the steps of:

inserting an adhesive material into the blind hole prior to step (d) where the elongated member is advanced into the hole, the adhesive material being of a quick-setting resin type; and

mixing the resin within the hole prior to step (e) where the gripping of the rock formation occurs.

22. The method of claim 20 wherein the further rotation of step (f) begins at a predetermined axial force.

23. The method of claim 20 wherein the further rotation of step (f) begins at a predetermined bolt torque.

24. The method of claim 20 wherein the further rotation of step (f) causes the support member to begin exerting a sufficient force against the expansion shell to diametrically expand a portion of the expansion shell permitting the axial traverse movement of the support member within the expansion shell.

25. The method of claim 24 wherein a split on the expansion shell facilitates diametric expansion thereof.

26. The method of claim 20 wherein the further rotation of step (f) causes the support member to begin exerting a sufficient force against the expansion shell to fracture a portion of the expansion shell permitting the axial traverse movement of the support member within the expansion shell.

27. The method of claim 26 wherein a weakened area on the expansion shell facilitate fracture thereof.

28. A method of installing a mine roof bolt assembly, comprising the steps of:

inserting a mine roof bolt assembly into a hole of a rock formation, the mine roof bolt assembly comprising a mine roof bolt, an expansion member threadingly engaged to the mine roof bolt, an expansion shell, and a support, the expansion shell having fingers engaged with expansion member and a base portion engaged with the support, the hole appropriately sized to frictionally prevent rotation of the expansion shell and the engagement of the fingers restricting rotation of the expansion member;

anchoring the mine roof bolt assembly to the rock formation within the hole by rotating the mine roof bolt, said rotation causing the support to force the expansion shell against the expansion member thereby forcing the fingers of the expansion shell to move radially outwardly and grip the rock formation; and

tensioning the mine roof bolt by continuing to rotate the mine roof bolt, said continued rotation causing the support to forcibly move within the base portion of the expansion shell.

29. The method of claim 28 further comprising the steps of:

inserting a resin material into the hole prior to the step of inserting the mine roof bolt assembly into the hole, the resin material for bonding the mine roof bolt assembly to the rock formation.

30. The method of claim 28 further comprising the steps of:

inserting a resin cartridge into the hole prior to inserting the mine roof bolt assembly into the hole;

rupturing the resin cartridge to release resin within the hole; and

agitating the released resin within the hole prior to allowing the resin to set.

31. The method of claim 28 wherein the tensioning occurs when the rotation of the mine roof bolt causes the support to provide a sufficient force to radially expand the expansion shell enough to permit axial movement of the support within the base portion of the expansion shell.

32. The method of claim 28 wherein the tensioning occurs when the rotation of the mine roof bolt causes the support to provide a sufficient force to fracture the expansion shell to permit axial movement of the support within the base portion of the expansion shell.